

Publication No.06-130740

Publication date:13.05.1994

Application No. 04-304497

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CLAIMS

[Claim(s)]

[Claim 1] A process cartridge characterized by having an image support, at least one process means to act with the image support and two or more frames which hold at least one process means and the image support in a removable process cartridge, wherein a part of all of the frames are jointed with a disengageable coupling means.

[Claim 2] The process cartridge according to claim 1, which has a developer frame for holding a developer of a development means as a process means, and a development frame for containing a development member, and combined said developer frame and development frame using a disengageable coupling means.

[Claim 3] The process cartridge according to claim 1 which is what is performed by stopping both frames.

[Claim 4] The process cartridge according to claim 1 which combines a developer frame and a development frame with a pressure sensitive adhesive double coated tape containing a foaming agent in a binder layer.

[Claim 5] The process cartridge according to claim 1 comprising an electrification means as said process means, a development means or a cleaning means, and an electrophotography photo conductor in one cartridge, and makes this cartridge removable to a main part of image formation equipment.

[Claim 6] The process cartridge according to claim 1, comprising at least one of an electrification means as said process means, a development means, and a cleaning means, and the electrophotography photo conductor in one cartridge, and is made removable to a main part of the image formation equipment.

[Claim 7] The process cartridge according to claim 1, comprising at least the developing device and the electrophotography photo conductor in one cartridge, and is removable to a main part of image formation equipment.

[Claim 8] An Image formation equipment capable of loading a process

cartridge and carrying out image formation, comprising:
a photoreceptor;
at least one of processing devices, affecting the photoreceptor;
frames to accommodate the photoreceptor and the processing device;
a loading means to accommodate a process cartridge jointed with a
disengageable coupling means a part or whole of the frames; and
a feeding device to feed a image support.

[Claim 9] The image formation equipment according to claim 8, being
an electrophotography copying machine.

[Claim 10] The image formation equipment according to claim 8, being
a laser beam printer.

[Claim 11] The image formation equipment according to claim 8, being
facsimile apparatus.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The field of Industrial Application] This invention relates to a
process cartridge capable of forming images and an image formation
apparatus that can be loaded with the process cartridge.

[0002]

[Description of the Prior Art] The image forming is performed uniformly
charging on an imaging support to form a latent image, developing the
latent image on the imaging support with a toner, and then the developed
toner is transferred onto an imaging support by an image forming
apparatus including a printer. Although the toner must be replenished
whenever it is short in such apparatus, the supply activity of this
toner may be troublesome and dirt. Moreover, it was inconvenient for
the users that the maintenance of each part material must be carried
out a special serviceman in many cases.

[0003] Then, by making a cartridge including said image support, an
charging device, a development device, the cleaning section, etc.
collectively to integral construction, when a user loads the main part
of equipment with said cartridge, what made possible the parts
replacement of the image support which reached supply of a toner and
a life, and made the maintenance easy is put in practical use.

[0004] Such a cartridge has been discarded as it is, if toner contained
therein was finished. Therefore, reusable components, for example,

various rollers etc., were discarded together. However, not disposal of a product but revival of components and recycle are beginning to be carried out like before in various electrical machinery and apparatus or electronic equipment for the purpose of saving resources, energy saving, and reduction of dust from a rise of earth environmental protection in recent years.

[0005] For example, in case of a process cartridge, a charging device, a development member or a cleaning member and so on can usable even if the toner in a cartridge is finished. Therefore, recently, the cartridges after toner use are collected, such component etc. is taken out, and it has come to recycle.

[0006]

[Problem(s) to be Solved by the Invention] However, although the various components attached in the frame, for example, components, such as a development member, must be removed when it recycles the frame which constitutes housing of a cartridge, it is further necessary to remove urethane foam, felt, etc. for toner leakage prevention. However, permanent fixing of the developer frame which contained the developer, for example, and the development frame which attached the development member combined with this is carried out by means, such as ultrasonic welding. And a seal is attached in opening of the developer frame which sends a developer into said development frame for toner leakage and moisture prevention of a toner, and when a user draws out said seal at the time of the beginning of using, a toner is supplied to a development frame from a developer frame.

[0007] For this reason, after drawing out said seal, it was difficult for opening of the developer frame with which permanent fixing of the development frame is carried out to attach a seal again, and recycling a developer frame and a development frame had taken time and effort.

[0008] This invention solves said conventional technical problem, and is made into the purpose is to offer the process cartridge and image formation equipment which made recycle of a frame easy.

[0009]

[Means for Solving the Problem] A typical means concerning this invention for attaining said purpose becomes considering having two or more frames which hold image support, at least one process means to act on said image support, and said image support and a process means, having combined said part or all frames of both using a separable coupling means, and having constituted a process cartridge as a feature.

[0010]

[Function] In said configuration, both frames are separable by

canceling association by the coupling means. For this reason, recycle of a frame can make easily.

[0011]

[Example]

[The first example] Next, the process cartridge and image formation apparatus that are applied to the first example of this invention are concretely explained with reference to a drawing.

[0012] The outline of whole image formation apparatus configuration which loaded with the process cartridge is explained. In addition, drawing 1 is cross-section explanatory drawing of the laser beam printer which is one mode of image formation equipment, and drawing 2 is cross-section configuration explanatory drawing of a process cartridge.

[0013] As shown in drawing 1 , this image formation apparatus A irradiates the light based on image information from optical system 1, and forms a developer (following toner) image on the photoconductor drum which is image support. And the toner image formed in said photoconductor drum in the image formation section which conveyed the record medium 2 with the conveyance means 3 synchronizing with formation of said toner image, and was cartridge-ized as a process cartridge B is imprinted to a record medium 2 with the imprint means 4, the record medium 2 is conveyed for the fixing means 5, it is established and an imprint toner image is discharged to the discharge section 6.

[0014] The process cartridge B which constitutes said image formation section is formed into a visible image by rotating the photo conductor drum 7 and the surface being uniformly charged with the electrification means 8, and exposing the light figure from said optical system 1 to the photo conductor drum 7 through the exposure section 9, forming a latent image, and forming the toner image according to said latent image with the development means 10, as shown in drawing 2 . And after imprinting a toner image to a record medium 2 with said imprint means 4, the toner which remained to the photo conductor drum 7 with the cleaning means 11 is removed. In addition, each part article of said photo conductor drum 7 grade is contained and cartridge-ized in the frame 12 which constitutes housing.

[0015] Next, the configuration of each part of said image formation equipment A and a process cartridge B is explained.

[0016] {Image formation equipment} The configuration of each part of

said image formation equipment A is first explained in order of optical system, a conveyance means, an imprint means, a fixing means, and a cartridge charger stage.

[0017] (Optical system) as optical system 1 irradiates a light figure to the photo conductor drum 7 by carrying out an optical exposure based on the image information read from the external device etc. and it is shown in drawing 1, laser diode 1b, polygon mirror 1c, and scanner motor 1d and image formation lens 1e and reflective mirror 1f are contained in optical unit 1a boiled main part of equipment 13.

[0018] And if a picture signal is given, for example from external instruments, such as a computer and a word processor, laser diode 1b will emit light according to said picture signal, and will irradiate polygon mirror 1c as an image light. This polygon mirror 1c carries out high-speed rotation by scanner motor 1d, it glares to the photo conductor drum 7 which the image light reflected by this polygon mirror 1c rotates through image formation lens 1e and reflective mirror 1f, and exposes the surface of this drum 7 alternatively, and forms the latent image according to image information.

[0019] (Record-medium conveyance means) If the configuration of the conveyance means 3 for next conveying record media 2 (for example, the recording paper, an OHP sheet, cloth, or sheet metal etc.) is explained, and it is in this example, two kinds of manual bypass feed and cassette feed of a record medium 2 are possible. If the configuration for carrying out interference feed sets the record medium 2 of one sheet or two or more sheets to feed tray 3a and image formation is started as shown in drawing 1 While sending in the record medium 2 on feed tray 3a into equipment by pickup roller 3b When the record medium 2 of two or more sheets is set, one sheet carries out separation feed at a time by the separation roller 3c1 and 3c2, and it conveys so that 3d [of resist roller pairs] 1 or 3d of tips of a record medium 2 may run against 2. And 2 carries out drive rotation according to image formation actuation, and conveys 3d [of said resist roller pairs] 1 or 3d of record media 2 to the image formation section. Furthermore, the record medium 2 after image formation is conveyed to the fixing means 5, and middle discharge roller 3e and 3f [of discharge roller pairs] 1 or 3f is discharged to the discharge section 6 by 2. In addition, between said each roller, 3g of guide members for guiding conveyance of a record medium 2 is prepared. Moreover, feed tray 3a constitutes sheathing of the main part 13 of equipment at the time of un-using it.

[0020] On the other hand, the configuration for carrying out cassette

feed feeds 2 with 3d [of every one sheet resist roller pairs] 1 or 3d of record media 2 in cassette 3h with which said loading section was loaded from the upper part by pickup roller 3i and feed roller 3j, when it has the cassette 3h loading section at the inner pars basilaris ossis occipitalis of the main part 13 of equipment and manual bypass of the record medium 2 is not carried out, as shown in drawing 1 . And it conveys by the same member as the case of said manual bypass feed 3d [of resist roller pairs] after 1 or 3d2. In addition, 3k is a sensor and detects the existence of the record medium 2 in cassette 3h.

[0021] (Imprint means) The imprint means 4 imprints the toner image formed in the photo conductor drum 7 in the image formation section to a record medium 2, and as shown in drawing 1 , it constitutes the imprint means 4 of this example with the imprint roller 4. That is, the toner on the photo conductor drum 7 is imprinted to a record medium 2 by pressing a record medium 2 with the imprint roller 4 to the photo conductor drum 7 of the process cartridge B with which it loaded, and impressing the voltage of the toner image formed in this imprint roller 4 at the photo conductor drum 7, and reversed polarity.

[0022] (Fixing means) The toner image imprinted to the record medium 2 by voltage impression of the fixing means 5 aforementioned imprint roller 4 is fixed. As shown in drawing 1 , the configuration has heater 5b in driving roller 5a which carries out drive rotation, and the interior, and the pressure welding of it is carried out to said driving roller 5a, and it consists of fixing roller 5c which carries out follower rotation. That is, in case the record medium 2 which had the toner image imprinted in the image formation section passes through between said driving roller 5a and fixing roller 5c, a pressure is impressed by press of both the rollers 5a and 5c, and heat is impressed by pyrexia of fixing roller 5c, and the toner on a record medium 2 is fixed to a record medium 2.

[0023] (Process cartridge charger stage) In said image formation equipment A, the cartridge charger stage for loading with a process cartridge B is prepared. The attachment and detachment to 13 carry out closing motion covering 14 to the main part of equipment of a process cartridge B by open Lycium chinense. That is, the closing motion covering 14 which can be opened and closed by hinge 14a is attached in the upper part of the main part 13 of equipment. And if said closing motion covering 14 is opened, the cartridge loading space is provided in the main part 13 of equipment, and the right-and-left guide member which is not illustrated is attached in the main part

inside left right wall side. The guide for inserting a process cartridge B in this right-and-left guide member is prepared, and he inserts a process cartridge B along with said guide, and is trying to load image formation equipment A with a process cartridge B by closing the closing motion covering 14.

[0024] {Process cartridge} The configuration of each part of the process cartridge B with which said image formation equipment A is loaded next is explained.

[0025] This process cartridge B is equipped with image support and at least one process means. There is a cleaning means for cleaning an electrification means to electrify the surface of image support, for example, a development means to form a toner image in image support, and the toner that remained on the image support surface as a process means here etc. The electrification means 8, the exposure section 9, the development means 10, and the cleaning means 11 are arranged around the electrophotography photo conductor drum 7 which is image support, and in housing which consists of a frame 12, it contains, and unifies, and the process cartridge B of this example is constituted removable on the main part 13 of equipment, as shown in drawing 2 . In addition, said frame 12 combines and constitutes two or more frames.

[0026] Next, the configuration of each part of a process cartridge B is explained in order of the photo conductor drum 7, the electrification means 8, the exposure section 9, the development means 10, the cleaning means 11, and a frame 12.

[0027] (Photo conductor drum) The photo conductor drum 7 concerning this example applies and constitutes the organic sensitization layer in the peripheral face of the drum base which consists of cylinder-like aluminum. The photo conductor drum 7 is rotated in the direction of an arrow head of drawing 1 according to image formation actuation by transmitting the driving force of the drive motor formed in the main part side of equipment to the gear (un-illustrating) which fixed this photo conductor drum 7 at the longitudinal direction one side edge of installation and this drum 7 rotatable to the frame 12.

[0028] (Electrification means) The electrification means uses the so-called contact electrification method which is for electrifying the surface of said photo conductor drum 7 uniformly, and was attached for the electrification roller 8 in this example, enabling rotation free to a frame 12. The electrification roller 8 prepares a conductive elastic layer in metal roller shaft 8a, prepares the elastic layer of high resistance on it further, and comes to prepare a protective coat in the surface further. A conductive elastic layer is what

distributed carbon in India rubber layers, such as EPDM and NBR, and is constituted, and the operation which draws the bias voltage supplied to roller shaft 8a is made. Moreover, even when the elastic layer of high resistance is constituted from polyurethane rubber etc., the thing containing the conductive impalpable powder of a minute amount is raised as an example and the high electrification roller of conductivity, such as a pinhole of the photo conductor drum 7, faces, the operation which restricts the leakage current to the photo conductor drum 7, and prevents the dive of bias voltage is made. Moreover, a protective layer is constituted from N-methyl methoxy-ized nylon, and the plastic material of a conductive elastic layer or the elastic layer of high resistance acts so that the photo conductor drum 7 may be touched and the surface of the photo conductor drum 7 may not be deteriorated.

[0029] And said electrification roller 8 is contacted to the photo conductor drum 7, the electrification roller 8 follows and rotates to rotation of the photo conductor drum 7 on the occasion of image formation, and the surface of the photo conductor drum 7 is electrified in homogeneity by superimposing and impressing direct current voltage and alternating voltage to the electrification roller 8 at this time.

[0030] (Exposure section) The exposure section 9 is for exposing the light figure irradiated from optical system 1 on the surface of the photo conductor drum 7 charged in homogeneity with said electrification roller 8, and forming an electrostatic latent image in this drum 7 surface on it, and constitutes the exposure section by forming the opening 9 for drawing said light figure on the upper surface of the cartridge frame 12.

[0031] (Development means) As shown in drawing 2 , in order that the development means 10 may have toner reservoir 10a which contains a toner (developer) and may send out a toner in toner reservoir 10a, toner delivery member 10b which rotates in the direction of an arrow head is prepared. Furthermore, it has magnet 10c inside, and by rotating, development sleeve 10d which forms a thin toner layer separates the photo conductor drum 7 and a minute gap on the surface, and is prepared in it.

[0032] When a toner layer is formed in the development sleeve 10d surface, enough frictional electrification charges to develop the electrostatic latent image on the photo conductor drum 7 by friction with a toner and development sleeve 10d are obtained. Moreover, in order to regulate the thickness of a toner, development blade 10e is prepared.

[0033] (Cleaning means) The configuration of the cleaning means 11 Cleaning-blade 11a for failing to scratch the toner which contacted the surface of the photo conductor drum 7 and remained to this drum 7, as shown in drawing 2 , In order to dip up said toner which it failed to scratch, it is located under said blade 11a, and constitutes from float sheet 11b which contacted the surface of the photo conductor drum 7 weakly, and waste toner reservoir 11c for collecting said dipped-up waste toners.

[0034] (Frame) If a frame 12 is explained below, the frame 12 concerning this example combines and constitutes three frames of toner frame 12a, development frame 12b, and cleaning frame 12c, as shown in drawing 2 .

[0035] The seal 12a2 for preventing the leakage and moisture of a toner which came to prepare toner reservoir 10a of the development means 10 and toner delivery member 10b in toner frame 12a, and were contained in toner reservoir 10a to the opening 12a1 is stuck. By drawing out at the time of the cartridge beginning of using, this seal 12a2 supplies the toner in toner reservoir 10a to development frame 12b. Development sleeve 10d and development blade 10e in which development frame 12b built magnet 10c are attached.

[0036] Moreover, cleaning-blade 11a and float sheet 11b are attached in the edge of cleaning frame 12c, and waste toner reservoir 11c is formed as a whole.

[0037] If it is in the process cartridge of this example, a cover and the whole are unified for the upper part of said toner frame 12a, development frame 12b, and cleaning frame 12c by cartridge covering 12d.

[0038] (Coupling means of a frame) Said toner frame 12a and development frame 12b are combined by the coupling means disengageable. That is, as shown in drawing 2 , the concave-like stop crevice 12b1 is formed in the cementation both ends of one development frame 12b at the longitudinal direction (the direction of the space table reverse side of drawing 2). on the other hand, the collar which can be inserted in the cementation edge of toner frame 12a in said stop crevice 12b1 at a longitudinal direction -- the charge fixing collar 12a3 of a ** is formed.

[0039] Therefore, in assembling both the frames 12a and 12b, after sticking a seal 12a2 on the opening 12a1 of toner frame 12a and plugging up this opening 12a1, it inserts so that the charge fixing collar 12a3 of toner frame 12a may be inserted from longitudinal direction opening of the stop crevice 12b1, and both the frames 12a and 12b are made

into an integrated state. And development sleeve 12d etc. is included in development frame 12b, and a toner is put in and sealed from toner insertion opening which is not illustrated to toner frame 12a. And when a user uses it, the edge of said seal 12a2 is pulled, and a seal 12a2 is drawn out and used.

[0040] Next, used cartridges are collected, it is brought together in a production base, and a cartridge is decomposed at a recycle production process. toner frame 12a is made to slide to a longitudinal direction along the stop crevice 12b1 of development frame 12b at this time -- it excels and the **** frames 12a and 12b are separated easily. Therefore, after decomposing each part material, such as development sleeve 12d, from development frame 12b and making both the frames 12 separate, it becomes possible by cleaning the inside of a frame and attaching the new seal 12a2 in the toner frame opening 12a1 with means, such as Ayr suction, to use both the frames 12a and 12b again.

[0041] In addition, it is possible to reuse the cleaning frame 12c by cleaning the inside of the toner reservoir 11 while discarding the waste toner in waste toner reservoir 11c, and replacing cleaning-blade 11a or the float sheet 11b.

[0042] {Recycle procedure of a process cartridge} Here explains the procedure of recycle of a process cartridge.

[0043] The procedures of the profile of recycle of a process cartridge are (1) recollection, (2) classification, (3) decomposition, (4) sorting, (5) cleaning, (6) inspection, and (7) reassemblies. It is as follows when this is explained concretely.

[0044] (1) Bring a recovery used process cartridge together in a recovery pin center, large by cooperation of a user, a serviceman, etc.

[0045] (2) Carry the used process cartridge collected in the collecting center to a cartridge recycle factory. And the collected used process cartridge is classified for every model.

[0046] (3) Disassemble the process cartridge classified, and take out components.

[0047] (4) Inspect and separate the components taken out reusable components and not reusable which is damaged or not suitable for reclamation.

[0048] (5) Clean only the components selected to make reclamation possible as components of a new cartridge.

[0049] (6) A function is fully inspected whether or not the components selected is reusable.

[0050] (7) Assemble a new process cartridge using the components.

[0051] Since toner frame 12a and development frame 12b are combined disengageable if it is in this example, (3) decomposition of said recycle procedure and (7) reassemblies can be performed easily.

[0052] The [second example] Although the first example mentioned above showed the example which combined toner frame 12a and development frame 12b by stopping the charge fixing collar 12a3 and the stop crevice 12b1, you may carry out as [join / as it is shown in drawing 3 / together / both the frames 12a and 12b].

[0053] That is, the stop pawl 12a4 is formed in the cementation both ends of toner frame 12a, and the projection 12b2 for said stop pawl 12a4 to stop to the joint both ends of development frame 12b is prepared and constituted. In this case, toner frame 12a is constituted from synthetic resin, elastic deformation of the stop pawl 12a4 is carried out using the elastic deformation of resin, and it hooks and fixes to projection 12b2. Moreover, when separating both the frames 12a and 12b, it can dissociate easily by canceling a stop condition by extending said stop pawl 12a4.

[0054] The [third example] Further, as shown in drawing 4 , a screw 15 may be made to perform association with toner frame 12a and development frame 12b. In this case, by removing a screw 15, both the frames 12a and 12b can be separated easily, and both the frames 12a and 12b can be assembled by screwing a screw 15 again.

[0055] The [fourth example] The example combined when each example mentioned above carried out a stop or the bis-stop of toner frame 12a and the development frame 12b was shown. Next, the example combined with a pressure sensitive adhesive double coated tape is shown.

[0056] As indicated in drawing 5 and drawing 6, toner frame 12a of the cartridge of this example and development frame 12b, they are joined together with the pressure sensitive adhesive double coated tape 17 through the toner leakage prevention seal 16 which consists of urethane foam or felt. That is, the pressure sensitive adhesive double coated tape 17 was stuck on the perimeter of a opening edge of toner frame 12a the toner leakage prevention seal 16 was stuck on this tape 17, the pressure sensitive adhesive double coated tape 17 was further stuck on said seal 16. By this constitution, the frames 12a and 12b are jointed.

[0057] Since bonding strength is weak when only said pressure sensitive adhesive double coated tape 17 is used, the engagement hole 18 was formed in four sides of the opening edge of toner frame 12a, and the protruding piece 19 which can be inserted in said engagement hole 18 has been formed in development frame 12b. And hole 19a for pressing

a pin 20 fit in said protruding piece 19 is prepared. Therefore, when combining toner frame 12a and development frame 12b with said pressure sensitive adhesive double coated tape 17, a protruding piece 19 is inserted in the engagement hole 18, and a pin 20 is pressed fit in hole 19a, and both the frames 12a and 12b are combined firmly.

[0058] In order to separate said toner frame 12a and development frame 12b, said pin 20 is removed and a pressure sensitive adhesive double coated tape 17 is performed by exfoliating from each frame 12a and 12b. The adhesion of this pressure sensitive adhesive double coated tape 17 must be powerful in order to combine Frames 12a and 12b, but when adhesion is powerful and it is recycle, even if exfoliating a pressure sensitive adhesive double coated tape 17 exfoliates by force difficult, a tape base material and a binder may remain in the field of Frames 12a and 12b. In order to remove the remaining binder etc., it must wash using an organic solvent. However, while a washing routing will increase to eye others, in the case of the metal with which the attachment section covered configuration resin and the surface, the organic solvent used for this washing has danger, such as dissolution of the attachment section, a crack, and a white blush mark. Therefore, in order to exfoliate a pressure sensitive adhesive double coated tape 17 and to carry out separation recycle of the frames 12a and 12b, it is desirable for adhesion to be weak at the time of tape exfoliation.

[0059] Then, the pressure sensitive adhesive double coated tape 17 of this example includes the foaming agent which foams in the binder layer prepared in both sides of a tape base material with heat. By this constitution, the gas contained in the adhesive layer will be generated when heated. By this, the irregularity by air bubbles arises in the interface of Frames 12a and 12b and a binder layer, a plane-of-composition product decreases as the result, adhesion declines, and exfoliation of a pressure sensitive adhesive double coated tape 17 becomes easy.

[0060] Therefore, while separation of Frames 12a and 12b can make easily, it becomes, without a tape base material and a binder layer remaining to Frames 12a and 12b.

[0061] As a material of the base material of the pressure sensitive adhesive double coated tape 17 used for this example, the sheet metal thing of various kinds, such as paper, cloth, a nonwoven fabric, a synthetic-resin film, a rubber sheet, and a metallic foil, can be used.

[0062] Moreover, one kind out of the synthetic resin which is adhesive as a material of a binder layer, synthetic rubber, for example, polyvinyl methyl ether, the polyvinyl ethylene ether, polyvinyl

isobutyl ether, a polyisobutylene, isobutylene isoprene rubber, chloroprene rubber, SBR, chlorinated rubber, cyclized rubber, a vinyl chloride vinyl acetate copolymer, polymethacrylic acid, polyacrylic acid, polymethacrylic acid ester, polyacrylic ester, an ethylene-vinylacetate copolymer, a polyvinyl butyral, etc. -- or two or more kinds can be mixed and it can use. Furthermore, as a tackifier, rosin, a rosin derivative, petroleum system resin, etc. can be added and used.

[0063] The forming agent is required the property in which it does not foam by prolonged ordinary temperature use in a binder layer and it decomposes by heating. As a class of foaming agent, an inorganic foaming agent, an organic foaming agent, a polymeric foaming agent, etc. can be used. As an inorganic foaming agent, powder, such as sodium bicarbonate, ammonium bicarbonate, and an ammonium carbonate, can be used. Moreover, as an organic foaming agent, powder such as azobis butyronitrile, tosyl hydrazide, tosyl hydrazide derivative, and benzenesulphonyl hydrazide, can be used. Furthermore, as a polymeric foaming agent, powder and beads, such as a polyethylene system foaming agent, a polypropylene system foaming agent, a vinyl chloride system foaming agent, a vinylidene-chloride system foaming agent, and an acrylic foaming agent, can be used.

[0064] These foaming agents can be used in single component or in two or more kinds mixed. Moreover, the foaming agent surface can be covered with various synthetic resin, and can also be microencapsulated and used with it. Furthermore, foaming assistants, such as a urea compound and a salicylic acid, can be added in order to adjust decomposition foaming temperature.

[0065] In addition, a foaming agent must be selected in consideration of a heat-resistant temperature of the frames 12a and 12b joined with a pressure sensitive adhesive double coated tape 17, and the division foaming temperature of the foaming agent. For example, it is necessary to use the foaming agent having the decomposition foaming temperature of 100 or less degrees C, if heat deflection temperature to the frames 12a and 12b of synthetic resin 100 degrees C or less.

[0066] The [fifth example] Although the fourth example mentioned above explained the case where toner frame 12a and development frame 12b were combined with an adhesive layer with the pressure sensitive adhesive double coated tape 17 containing a heating foaming agent, you may make it join other members using said pressure sensitive adhesive double coated tape 17. For example, as shown in drawing 7 and drawing 8, development sleeve 10d, development blade 10e, etc.

are attached in development frame 12b, but in order to prevent that a toner leaks from development sleeve 10d longitudinal direction both ends or the reverse side of development blade 10e at this time, the toner leakage prevention seals 21 and 22 are formed. Moreover, in order to receive the toner which fell from development frame 12b, the toner receptacle film 23 is attached in the lower part of development frame 12b.

[0067] You may make it stick with the pressure sensitive adhesive double coated tape 17 used in the fourth example which mentioned above these toner leakage prevention seals 21 and 22 and the toner receptacle film 23. If it does in this way, in case a used cartridge is collected and recycled, with the fourth example having explained, similarly, the toner leakage prevention seals 21 and 22 and the toner receptacle film 23 can be exfoliated easily, and recycle becomes easy.

[0068] [Another Example] Although the example constituted from an example mentioned above with 3 of a toner frame, a development frame, and a cleaning frame frames as two or more frames was shown, when it constitutes from said three frames, it is not necessary to limit a frame. Therefore, when combining the toner frame and development frame which also mentioned association between frames above, it is not necessary to limit.

[0069] Moreover, the process cartridge B concerning this invention is applicable suitable not only when forming a monochromatic image as mentioned above, but for the cartridge which establishes two or more development means 10, and forms the image (for example, 2 color images, 3 color images, or full color **) of two or more colors.

[0070] Moreover, it is possible to use the various developing-negatives methods, such as the 2 component MAG brush developing-negatives method well-known also as the development method, the cascade developing-negatives method, the touchdown developing-negatives method, and the cloud developing-negatives method.

[0071] Moreover, although the so-called contact electrification method was used in the first example which also mentioned the configuration of an electrification means above Metal shields, such as aluminum, are given to the perimeter of a three way type of the tungsten wire used from the former as other configurations. Naturally the configuration which is made to move the positive or negative ion produced by impressing the high voltage to said tungsten wire to the surface of a photo conductor drum, and is uniformly charged in the surface of this drum may be used. In addition, as said electrification

means, things, such as a blade mold (electrification blade), a pad mold, a block type, a rod mold, and a wire mold, may be used besides said roller mold.

[0072] Moreover, a cleaning means may be constituted, using a blade, a fur brush, a magnetic brush, etc. also as the cleaning method of the toner which remains to a photo conductor drum.

[0073] The process cartridge mentioned above is the one having an photo conductor and at least one of the process means. Therefore, as a mode of the process cartridge, besides the thing of the example mentioned above, for example, image support and an electrification means are cartridge-ized in one, and are made removable on the main part of equipment. What cartridge-izes image support and a development means in unification, and makes them removable on the main part of equipment. What cartridge-izes image support and a cleaning means in one, and makes them removable on the main part of equipment. Furthermore, it cartridge-izes in one combining image support and two things or more of said process means, and some which are made removable are in the main part of equipment.

[0074] That is, the process cartridge mentioned above cartridge-izes an electrification means, a development means or a cleaning means, and an electrophotography photo conductor in one, and makes this cartridge removable to the main part of image formation equipment. And at least one and the electrophotography photo conductor of an electrification means, a development means, and a cleaning means are cartridge-ized in one, and suppose at the main part of image formation equipment that it is removable. Furthermore, what cartridge-izes a development means and an electrophotography photo conductor in one at least, and is made removable at the main part of equipment is said.

[0075] Moreover, although the laser beam printer was illustrated as image formation equipment in the example mentioned above, it is not necessary to limit this invention to this example. Naturally it is also possible to use the invention for other image formation equipments, such as an electrophotography copying machine, facsimile apparatus, or a word processor.

[0076]

[Effect of the Invention] As mentioned above, since the part or all frames of both were combined among two or more frames which constitute a process cartridge using the separable coupling means, both frames can be separated easily and it becomes possible to perform recycle of a process cartridge easily, by canceling association by said coupling means.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is cross-section configuration explanatory drawing of the image formation equipment loaded with the process cartridge concerning the first example of this invention.

[Drawing 2] It is cross-section configuration explanatory drawing of a process cartridge.

[Drawing 3] It is explanatory drawing of the example which combines a toner frame and a development frame with a stop pawl.

[Drawing 4] It is explanatory drawing of the example which combines a toner frame and a development frame on a screw.

[Drawing 5] It is explanatory drawing of the example which combines a toner frame and a development frame with a pressure sensitive adhesive double coated tape.

[Drawing 6] It is explanatory drawing of the example which attaches a toner leakage prevention seal in the opening end face of a toner frame with a double-sided tape.

[Drawing 7] It is explanatory drawing of the example which joins a toner leakage prevention seal, a sheet, etc. with a double-sided tape.

[Drawing 8] It is strabism explanatory drawing of the development frame furnished with a toner leakage prevention seal.

[Description of Notations]

A [-- Optical unit,] -- Image formation equipment, B -- A process cartridge, 1 -- Optical system, 1a 1b -- Laser diode, 1c -- A polygon mirror, 1d -- Scanner motor, 1e [-- Conveyance means,] -- An image formation lens, 1f -- A reflective mirror, 2 -- A record medium, 3 3a -- A feed tray, 3b -- A pickup roller, 3c1, 3c2 -- Separation roller, 3d1, 3d2 -- A resist roller, 3e -- A middle discharge roller, 3f1, 3f2 -- Discharge roller, 3g [-- Feed roller,] -- A guide member, 3h -- A cassette, 3i -- A pickup roller, 3j 3k [-- Driving roller,] -- A sensor, 4 -- An imprint roller, 5 -- A fixing means, 5a 5b [-- Photo conductor drum,] -- A heater, 5c -- A fixing roller, 6 -- The discharge section, 7 8 [-- A development means, 10a / -- Toner reservoir,] -- An electrification roller, 8a -- A roller shaft, 9 -- The exposure section, 10 10b [-- Development blade,] -- A toner delivery member, 10c -- A magnet, 10d -- A development sleeve, 10e 11 -- A cleaning means, 11a -- A cleaning blade, 11b -- Float sheet, 11c [-- Opening,] -- A waste toner reservoir, 12 -- A frame, 12a

-- A toner frame, 12a1 Twelvea2 [-- Development frame,] -- A seal, 12a3 -- A charge fixing collar, 12a4 -- A stop pawl, 12b Twelveb1 -- A stop crevice, 12b2 -- A projected part, 12c -- Cleaning frame, 12d -- Cartridge covering, 13 -- The main part of equipment, 14 -- Closing motion covering, 14a [-- A pressure sensitive adhesive double coated tape, 18 / -- An engagement hole, 19 / -- A protruding piece, 19a / -- A hole, 20 / -- 21 A pin, 22 / -- A toner leakage prevention seal, 23 / -- Toner receptacle film] -- A hinge, 15 -- A screw, 16 -- A toner leakage prevention seal, 17

Confirmed by Hayato Konishi February 9, 2004